Electronic Version
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Claims

[c1] The embodiments of techniques and design are claimed as follows:

1.The Object Approaching Safety View Anti-Blind e-Mirrors System promotes a new method of driving safety view for motor vehicles from optical type to optoelectronic type. This new method meet the need of higher safety view standard for more & more crowded traffic system in the future due to the rapid growth of population.(Please go through all 12 pages of figures first). It fills out also the blank of all large trucks and buses missing the center rear mirror.

[c2] 2.The integration of The e-Mirrors system. It's integrated with night vision capable multi micro CCD cameras + high definition low distortion board Lens + high resolution multi- small LCD panels + angle title-able special design camera mounts. (skim all P12 figures) The cameras are mounted on specific corner points, so to get perfect views to detect any object or vehicles around approaching to your vehicle. (see P8, P7 figures)

[c3] 3. Overcome all blind spots any other problems found in regular optical mirrors (see section Detailed Description

) and a lot more. The e-mirrors system not only overcome all blind spots of 40 years old conventional optical mirrors , but also extend driver's eyes to view the rear surround the vehicle, get the proximity view of any vehicle or object approaching to your vehicle, more over regular optical mirrors that reflects only deepness and size.

[c4] 4. Avoid, and react earlier concept. With this object approaching proximity view-able e-Mirrors system, any approaching object around your vehicle can be found, and driver can have enough second to react earlier to avoid collision. The e-Mirrors system will significantly reduce traffic accidents each year if to apply earlier.

[c5] 5. e-Mirrors side by side dual screen for small vehicles. A pair of flat panel high resolution 5"to 5.6"LCD screens (around similar size of optical side mirrors), with synchronized brightness and contrast control, is mounted on dashboard near to center. The e-Mirrors will be set in same view direction with passenger side mirror. (see P4 figures).

[c6] 6. e-Mirrors for large vehicles using quad display. For large vehicles, like container tow trucks, gas tank tow trucks, school buses, public buses etc, A large e-mirror is made with 8.4"to 15"inch size single video LCD panel(similar size of their side mirrors), is mounted on front

dash near to passenger tool box for drivers rapid view. The e-Mirror is connected with 4 channel quad split video processor to present all blind spots around the large vehicle. The e-mirror can also be made with 2 x 2 array of small LCD screens. (see P10, P11 figures)

[c7] 7. Dual micro CCD cameras apply for rear views setting to cover 180 degree full rear vision. (see figure 6A) This setting get 4 benefits:

1) Dual setting eliminates the blind spots at both side found in some single camera rear view system.(see figure 2C)

2) Dual cameras setting is also minimize the super wide angle distortion found in single camera setting, which shrinks the rear object to tiny image and difficult to estimate the proximity of a back vehicle or object.

3) Dual cameras setting enhance video definition since using reduce wide angle of lens. In optical theory, wide angle is conflict to definition.

4) Dual Camera will cover the whole 180 degree of view (90^{0} X 2), single camera will never reach that angle.

[c8] 8. Object approaching detection anti side blind spot technique. To make it possible, a camera must be mounted out of front corner of vehicle a few inches using a short bar like bracket at passenger side. It's mounted like side mirrors. (see P8, P9, figure 9A)

[c9] 9. Rear cameras license plate on frame L-R stereo mounts with wide angle tilt-able mechanism. (see figure 5C, P6 figures). The angle tilt-able mechanism will be critical to large truck drivers. Since large trucks do not have center mirror. They need narrow angle 60 degree dual rear cameras and need to tilt the cameras screen viewing the rear corners when backing out.

[c10] 10. Rear cameras license plate stereo mounts can apply to any automobiles without drilling screw holes nor modification to the shiny finish coating of vehicle . This feature will receive great welcome to owners driving luxury cars like Mercedes Benz, Porsche, Lexus, BMW etc.

[c11] 11. Rear object proximity detection anti rear blind spot corner mount technique. When pulling a vehicle out of a parking spot. The turn corner of your vehicle will be heading out first. (figures P6). The best setting to view proximity is as figures P7. Left camera views right , right camera views left. However, that setting will be high cost to mount CCD cameras on rear corners of a new vehicle. This technique is good for new design vehicle, factories can pre-mount camera inside the tail lights, or brake lights

[c12] 12. Rear object proximity detection license plate mount

technique. License plate on frame dual cameras stereo mount is the most easy and uniform mount to all vehicles. (see P6 figures). This method is perfect good for luxury vehicle. since the installation does not need to drill holes nor to modify the car shiny finish coating. (see Figure 5C) Another goodness to this mount is the easy power supply from license plate light to cameras.

[c13] 13. License plate dual rear cameras mount angle view adjustable to large vehicles without central rear mirror, like truck, tow truck, bus etc. Camera Lens 65 to 90 degree options. So to match with image size of optical side mirrors. If 65 narrow angle lens are applied, when backing out a truck, driver can adjust the dual rear cameras viewing on rear corners to get proximity view. Single driver can back out a large tow truck safely. After the back out operation, cameras angle can be adjusted to straight back. (see Figure 10C)

[c14] 14. Super night vision, high Signal / Noise ratio, Day & night ultra dynamic auto compensation outdoor CCD custom design camera. (see P3 figures)

1) Super night vision for countryside driving. The cameras can view objects surround the vehicle at suburban dark night without road lights, nor city light, near human eyes invisible threshold. The super sensitive CCD chip and special design large iris lens make it possible.

2) High Signal / Noise ratio (52-to-60 db). It's the highest ratio in the market comparing to regular 40- to 48 db)The latest 6th generation DSP (Digital Super Processor) chip make it possible.

3) Day & night ultra dynamic auto compensation outdoor usage without blur video effect . The cameras can "see" under high beat head light or under sunlight without showing burning video effect. Under dark environment, you don't see heavy snow noise on the e-Mirrors. The latest generation DSP (Digital Super Processor) chip and highest tolerant special circuit design make it possible. (P3 figures)

4) Using micro water proof enclosure for vehicle external use. (figure 3B)

[c15] 15. Special design of micro board lens: super large iris and, 90 degree right angle, ultra low distortion, high resolution. so to eliminate typical focal Len serious convex distortion, best meet to the requirement of rear view cameras. (figure 3C) Thanks to the support of a China optical component factory. They gave us a great insight when we design the new curve optical lens with more glass layers combination.

1) Using finger nail size micro board lens, instead of large diameter regular indoor CS mount lens for vehicle use cameras. Nevertheless , all optical performances in

our new design board lens are even better than large size CS mount lens, when the total size is only 1/6 of CS lens

2) Super large optical iris. 8.5mm-to-9 mm diameter compare to regular 4 or 4.5 mm board lens iris. That ultra iris make it possible for maximum light throughput and high optical power, so to produce the super sharp video image and highest definition. This advantage makes the video image 4 -5 times brighter than regular board lens I the market.

3) Large object Lens to minimize convex distortion image while keeping 90 degree wide angle view lens. (figure 3C-2, 3D). Drivers often criticize problems found in some single rear view camera: shrinking image, heavy convex distortion image. blur image, fuzzy video etc. You don't see those problem again in our unique design Lens.

4) Dual 90 degree horizontal right angle Lens, (not wider than 95 degree each) best cover 180 degree rear view, and show rear objects size to match with image size in regular reflective rear mirror. Control the convex distortion under 9 % (regular lens are 25%-30% distortion)

Never think an indoor camera can work for a car in outdoor day & night full weather requirement.

[c16] 16. Camera mounts for large motor vehicles, like container truck, trailer tow truck, gas tank tow truck, school bus, and public bus etc. The configuration will use 4 cameras, 2 on middle of the body, other 2 on the rear corners or on the license plate L-R. see P10 figures.

[c17] 17. Panoramic Safety View Anti-Blind e-Mirrors System for Mission Vehicles. This system apply 5 cameras to create panoramic view for mission vehicles. A blind spot view camera in driver side is applied (see figures 11B, 12B). Its LCD e-Mirror setting is a bit challenge. It can not set at central with the right e-Mirror. The best setting point is on dashboard left corner, so to get the same view direction of outdoor left mirror.

[c18] 18. Center rear view auto zoom camera for mission vehicles. This is the 5th camera.(see figures 11A) It use auto-focus lens adjustable from 60 -to- 15 degree. (see figure 11D) It can view any following vehicles behind you and can zoom in like telescope. The center rear auto zoom camera is mounted inside the rear wind shield or is hided inside of the vehicle. Meanwhile, a switch control will let driver switch (views when display 4 cameras view on dual screen e-mirror. (See figure 12C) Panoramic View Anti-Blind e-Mirrors System for Mission Vehicles is best for military vehicles, highway patrol , border patrols, police vehicles, secret service vehicles,

fire truck, armored truck, government vehicles, sport & racing vehicles etc.

[c19] 19. e-Mirrors as part of rapid view instruments for spot racing vehicles. (see figure 11B, 12B, 12C) The driver side blind spot e-Mirror is best for sport racing vehicles. Since racing cars usually pass from left side. Rapid viewing (glancing) left side blind spot without turning driver's head away from forward view is critical to racing drivers. Racing drivers always be caution when any racing car attempt to pass him. Driver is in high tension at super racing speed. He dose not even have chance to turn his head left when racing in 120 mph such super speed. Racing vehicle will run over 171 feet in just 1 second. That distance is enough to hit other vehicles at front or to hit road side and flip over (then crash). In such " no head turn allow "critical situation, glancing on the left e-Mirror checking the blind spot will be super advantage to those racing drivers.
For future spot vehicles design, the left e-Mirror can integrate with dash board design and near to the engine speed meter. That combination can call rapid view instruments for racing driver.

[c20] 20. e-Mirrors multiple configurations for variety vehicles at different safety view level.
1) For small vehicles, connection is as figure 12C

[c21] 2) For mission vehicles, will add on configuration figure 12B, 12C.

[c22] 3) For large vehicles, connection will combine digital quad video processor. See figure 12E.

[c23] 4) For tow trucks, beside the 3), rear cameras might apply video boosters since they are 50 feet away from the e-mirror on dashboard. It depend on the coaxial video cables grade, and the trailer length.

[c24] 21. Vehicle hood front corner side edge mount technique. No visible drilling holes on shiny coating of vehicle. (see figures 9A, 9B) This technique is very good for existing luxury cars and SUV. For new design car, factory can pre-make a mount space and bracket at the front corner for anti blind camera.

[c25] 22. Aerodynamic design and 3 dimensional title-able bracket for front camera , avoids unnecessary airflow turbulence at high speed. Flexible angle mount will fit cars and vans different sloping angle hood .(see figure 9B)